AGENDA

• Newalta Overview
• MFT Centrifuge Process
• Chronology of MFT Centrifuging Projects
• Experience
• Advantages
• Solids Transport Options
• Opportunities

Full Scale MFT Centrifuge
NEWALTA CORPORATION

- Established 1993 with HQ in Calgary

- 700 Employees and Facility Network throughout Canada and U.S.

- Strong presence developed in Oil Sands and Heavy Oil region with Facilities and Onsite Operations

- Excellent Safety Record (currently 0.4 TRIF YTD)

- Named “Supplier of the Year” in Oilsands Review
MFT CENTRIFUGE PROCESS

- DEBRIS
  - SCREEN
  - SURGE POND
- COAGULANT
- POLYMER

- DREDGE
- MFT

- FEED TANK
- EFFLUENT RETURN
- CENTRIFUGES
- CENTRATE TO POND
- CONVEYOR - TRUCK
- SOLIDS TO DEPOSITION

- SOLIDS PUMP - PIPELINE
CHRONOLOGY OF MFT CENTRIFUGING

- Pilot Project - Midsize Centrifuges
- Field Trial - Commercial Scale Centrifuges
- Commercial Demonstration Plant
- Trial Centrifugation Plant – Units 1&2
- Centrifugation Plant – Added Units 3&4
- Full-Scale Plant Commissioning and Operations
• Design, build & operate pilot plant
• Piloted three different mid-sized centrifuges
• Tested static & dynamic mixing with two different polymers
• Successful results supported progression to a larger commercial pilot
MFT CENTRIFUGE PILOT FACILITY (2011)

- Design, build & operate pilot plant
- Piloted two different full-scale commercial-sized centrifuges
- Large scale trials with static & dynamic mixing
- Successful trials supported the Commercial Demonstration Plant
COMMERCIAL DEMONSTRATION PLANT (2012)

- Capable of processing over 40,000 m$^3$/day of pond MFT (14,000 TPD dry)
- 9 full scale centrifuge trains
- Large-scale polymer hydration system
- Coagulant slurry system
- Conveyors utilized for solids transport
- Automated/Independent Process Control Network
- Modular Design; Fabrication Offsite; No pilings/foundations
Dual Train MFT Centrifugation Process
- Design, build and operations support (Units 1 and 2)
- Processing capacity of 8,500 m$^3$/day of pond MFT (3,000 TPD)
- Utilizes solids pumps instead of conveyors for solids transport
Capacity Expansion

- Supply of two additional centrifuge trains (Units 3 and 4)
- Increased capacity to 17,000 m$^3$/day of pond MFT (6,000 TPD)
MFT CENTRIFUGING EXPERIENCE

Insights & Observations

- Centrifuge feed density ideally 30% solids (by weight)
- Commercially solids can be produced over a wide range (45 – 55%)
- Centrate (liquid) typically 0.5 – 2% with 95% fines capture

- Polymer addition less sensitive than other MFT technologies
- Polymer consumption optimized but remains one of the highest operating costs
- Coagulant addition is necessary to achieve high solids densities

- Maintenance lower than expected
- Moderate g-force is adequate
- Differential speed is important
ADVANTAGES OF CENTRIFUGING MFT

Year-Round Operation
• Since 2012, operated through winter seasons

Timely Results
• Trafficable deposits within expected timeframes

Parallel Train Design
• Accommodates variable feed rates
• Increased plant availability & reliability
ADVANTAGES OF CENTRIFUGING MFT

Dryness
• Up to 55% by weight

Chemical Optimization
• Depth of experience through various trials & extended operations

Modular
• Quick to deploy as required
• Sized to meet production targets
SOLIDS TRANSPORT OPTIONS

Conveying
• Centrifuged MFT is conveyable
• Slope & transfer points challenging
• Transfer to truck for any distance
• Cold weather challenges

Pumping
• Centrifuged MFT can be pumped
• Higher densities challenging
• Currently pumped up to 1 km
• Easier to operate in cold weather
OPPORTUNITIES FOR MFT CENTRIFUGING

Enhancement & Optimization

1. Proven Technology
   • Viable “state-of-the art” option for fines capture in Oil Sands tailings

2. Existing Installations
   • Greater throughput
   • Optimization of chemical type & dosage
   • Lower operating and maintenance costs

3. Future Installations
   • Optimizing or eliminating solids transport
   • Reduced footprint in tailings environments
   • Expanded ability for relocation
   • Increased automation for remote operations
Key Takeaways

- Series of successful modular plants for centrifuging Oil Sands tailings
- Combines proven and new technologies for the best solution
- Designs customized to specific site requirements
- Proven track record of designing & executing within short timelines
- Reliable operations in all weather conditions
- Future installations to evolve with changing tailings environments
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